

Ted Shapiro, California Water Project, Option iii. San Francisco and the Bay Area. Final Version.

Overview:

The San Francisco Bay Area is a region that is diverse in many ways, including geographically and hydrologically. Numerous small streams run into the Bay from the surrounding hills, but the major sources of fresh water for the Bay, are the Sacramento and San Joaquin Rivers, which flow into the northeastern part of San Francisco Bay via Suisan Bay and the delta. Today, much of the land around the Bay is covered in a patchwork of cities and towns, with their water provided by more than 50 water agencies which rely on a complex web of dams, aqueducts, and pumps to supply that water. [Sommer, L. (Feb 28, 2014) *Bay Area: Do You Know Where Your Water Comes From?* Retrieved from <https://www.kqed.org/science/14623/bay-area-do-you-know-where-your-water-comes-from> 2019/11/4]

The landscape and waterscape of the San Francisco Bay Area were, however, not always like this. For millennia, Native Americans lived around the Bay, and altered the natural hydrological systems very little. Even the Spanish, who founded San Francisco in 1776, and soon spread out around the Bay, did little to alter the natural hydrological systems. [Wikipedia, San Francisco. (n.d) Retrieved from https://en.wikipedia.org/wiki/San_Francisco 2019/11/14]

History:

It was the discovery of gold at Sutter's Mill in 1848 and the ensuing Gold Rush, that led to the massive replumbing of California's waterways. The goldminers built hundreds of miles of sluiceways to divert water from streams, for the purpose of washing the soil and gravel away from the gold. When the gold began to play out, some of the miners turned to farming, and began to pump and divert water for their crops and livestock. At the same time, San Francisco and other cities around the Bay (and throughout California) were growing rapidly, putting tremendous demands on local water supplies.

In 1873, President Ulysses S. Grant commissioned Colonel B. S. Alexander of the U.S. Army Corps of Engineers to carry out a survey of California's water resources. Five years later in

1878, the State of California followed up with its own study, which was carried out by William Hammond Hall of the newly created State Engineer's office. 1919 Lt. Robert B. Marshal of the U.S. Geological Survey proposed a statewide water project. In 1931, State Engineer Edward Hyatt submitted a report identifying the facilities that would be needed and the amount of money that would be required to accomplish the transfer of water from Northern California to Southern California. Called the "State Water Plan" the report took nine years and \$1 million to prepare. However, due to the Great Depression, the project was not started until 1935. The project mainly transferred water from northern to southern California, but some water went to the Bay Area. In 1945 the State of California carried out another water resources survey.

[California Department of Water Resources: History. (n.d.) Retrieved from <https://water.ca.gov/Programs/State-Water-Project/History> 2019/11/4]

During the nineteen fifties, the Division of Water Resources (DWR) submitted plans for the Feather River Project, a proposal which called for a dam, reservoir, and power plant near Oroville California, along with aqueducts to carry the water to the Bay Area, and the San Joaquin Valley. In 1955 the San Luis Reservoir along with the South Bay Aqueduct were added to the proposal. In 1957 the North Bay aqueduct was also added to the proposal. Also in 1957, construction began on Oroville Dam before the project had even been approved. During the 1950's there was considerable political jockeying over the project among the various stakeholders and interested parties.

The California Water Resources Development Bond Act, commonly known as the Burns-Porter Act, was placed on the November 1960 statewide ballot. On November 8, the Burns-Porter Act was narrowly approved by a slim majority, and the State Water Project was born. [California Department of Water Resources: History. (n.d.) Retrieved from <https://water.ca.gov/Programs/State-Water-Project/History> 2019/11/4]

"The California State Water Project (SWP) is a water storage and delivery system of reservoirs, aqueducts, power plants and pumping plants extending more than 700 miles—two-thirds the length of California.

Planned, constructed, and operated by the Department of Water Resources, the SWP is the nation's largest state-built, multi-purpose, user-financed water project. It supplies water to more than 27 million people in northern California, the Bay Area, the San Joaquin Valley, the Central Coast and southern California. SWP water also irrigates about 750,000 acres of farmland, mainly in the San Joaquin Valley." [California Department of Water Resources: State Water Project (n.d) Retrieved from <https://water.ca.gov/Programs/State-Water-Project> 2019/11/4]

In addition to the California State Water Project (SWP) there are extensive federal and local water projects throughout the State.

geography

As mentioned earlier, the geography of the San Francisco Bay Area is quite diverse. At the center of the Bay Area, sits San Francisco Bay itself, a large well protected cold, saltwater bay with a very narrow opening to the Pacific Ocean. In time past, the Bay supported an abundance of marine life, and, where it meets the delta, an abundance of waterfowl. Even today, there is still significant marine and birdlife in and on the Bay. Surrounding much of the Bay is a ring of low-lying land, much of which was in time past saltmarsh, but today, has largely been converted to other uses. Beyond the (former) salt marshes is low lying, drier land, and in the delta, freshwater marshes, much of which have been converted to agriculture and other uses. Further out still, the land slopes upward to hills and low mountains on both sides of the bay, although the delta and part of the North Bay are level for a considerable distance. When Europeans and their descendants arrived on the scene in the late eighteenth century, there were native villages, salt marshes, freshwater marshes, grasslands, oak woodlands, and chaparral, as well as redwood and Douglass fir forests around the Bay. Today, the people, fauna, and flora of the Bay Area have been drastically altered; to a lesser extent, even the terrain has been altered, and many of the waterways have been dammed and or diverted.

Climate

The climate of the San Francisco Bay Area is Mediterranean, with cool rainy winters, and dry summers. This is problematic for agriculture, because it doesn't rain during the growing season. This means that most crops require irrigation and the water must be captured behind dams during the winter when it is raining or during the spring when the snow in the mountains melts. Also, this means that the water, once captured, must be transported from the reservoirs to the farms, which necessitates aqueducts. For household and industrial water usage the challenges are similar.

Water reliant industries.

The vast majority of water diverted by humans in California is used for agriculture, some eighty percent. In terms of dollar value, California is the leading agricultural state, with its agricultural output worth billions of dollars. Without its vast infrastructure of dams, reservoirs, and aqueducts, this agricultural bounty would not be possible. The generation of electricity is also heavily reliant on water, whether for hydroelectric dams, geothermal plants, nuclear plants, or coal, oil, and natural gas fired electric power generating stations, water is necessary. Since most industries are dependent on electricity, they are indirectly dependent on water.

Human geography

Much of Northern California's population is concentrated around San Francisco Bay, a relatively small area where only a small fraction of the State's precipitation falls. Typically, the local precipitation is not enough for local needs in the Bay Area. Therefore, many water districts must bring water in from some distance away. Marin County is unusual for the Bay Area in that it gets the majority of its water from local streams and reservoirs, although some is brought in from the Russian River. Much of the East and South Bay gets some water from the Sacramento and San Joaquin Rivers, some of it captured nearby in the delta, and some captured further upstream and transported for many miles in aqueducts; but the Hetch Hetchy Reservoir is also an important source of water for the region. [Sommer, L. (Feb 28, 2014) *Bay Area: Do You Know*

Where Your Water Comes From? Retrieved from <https://www.kqed.org/science/14623/bay-area-do-you-know-where-your-water-comes-from> 2019/11/4]

San Francisco and the Hetch Hetchy Water System.

San Francisco was the first nonnative human settlement in Northern California. It is built on a narrow peninsula which has little water. The city was founded by the Spanish around the time of the American Revolution and at first grew slowly. Beginning with the California Gold Rush of 1849, the city grew rapidly, putting a strain on the relatively meager local water supplies. In 1906, after the big earthquake, the City of San Francisco began to look into augmenting its water supply and concluded that the Hetch Hetchy Valley would be an ideal reservoir site. The City petitioned the Department of the Interior for water rights to the Tuolumne River in the Hetch Hetchy Valley, and in 1908 James R. Garfield, the Secretary of the Interior granted San Francisco the water rights to the Tuolumne River. Because the Hetch Hetchy Valley lay in Yosemite National Park, San Francisco had to get permission from the United States Congress to build a dam in there. In 1913 Congress passed the Raker Act, granting San Francisco permission to build a dam in the Hetch Hetchy Valley. In 1914 construction began on the Hetch Hetchy Railroad which was intended to bring supplies and equipment to the dam site. In spite of opposition from the Sierra club, construction of O'Shaughnessy Dam began in 1919 and was finished in 1923. Electrical generating stations, tunnels, and an aqueduct to bring the water to the Bay Area were also constructed, and in October of 1934 the first Hetch Hetchy water flowed into San Francisco. Later the O'Shaughnessy Dam was raised to its present height of 312 feet. The Hetch Hetchy project is said provide eighty percent of the water needs for 2.6 million people in the San Francisco Bay area, and the water is some of the cleanest in the Country.

[Wikipedia, Hetch Hetchy. (n.d.) Retrieved from https://en.wikipedia.org/wiki/Hetch_Hetchy 2019/11/4]

The California Water Plan:

“The California Water Plan is the State's strategic plan for sustainably managing and developing water resources for current and future generations. Required by [Water Code](#) Section 10005(a), it presents the status and trends of California’s water-dependent natural resources; water supplies; and agricultural, urban, and environmental water demands for a range of plausible future scenarios.

The plan:

- **Is updated every five years**
- **Provides a way for various groups to collaborate on findings and recommendations and make informed decisions regarding California’s water future**
 - **Elected officials**
 - **Government agencies**
 - **Tribes**
 - **Water and resource managers**
 - **Businesses**
 - **Academia**
 - **Stakeholders**
 - **General public**
- **Can't mandate actions or authorize spending for specific actions**
- **Doesn't make project- or site-specific recommendations nor include environmental review or documentation as would be required by the California Environmental Quality Act (CEQA)**

- **Requires policy- and law-makers to take definitive steps to authorize the specific actions proposed in the plan and appropriate funding needed for their implementation”** [California Department of Water Resources: California Water Plan. (n.d.) Retrieved from <https://water.ca.gov/Programs/California-Water-Plan> 2019/11/4]

Importance:

The importance of the California Water Plan, along with the water infrastructure of the various entities, would be hard to overstate. The water infrastructure allows the cities and farms of the Bay Area, (and the entire state) to exist. The California water plan serves as a blueprint for water development and use, and is also used to arbitrate disputes among stakeholders and interested parties, such as southerners and northerners, cities and farmers, fisherman and industry, and human usage versus non-human usage.

Current Issues:

The 1977-1978 drought severely tested California’s water infrastructure. Marin County was particularly hard hit due to the fact that it depends largely on local water supplies. One of the Marin Municipal Water District reservoirs completely dried up and the fish lay dead on the dry, cracked, lake bottom. People didn’t flush their toilets or wash their cars; the situation became so dire that a temporary water line was strung across the Richmond-San Rafael Bridge to bring water to drought-stricken Marin. [Wikipedia: Richmond-San Rafael Bridge. (n.d.) Retrieved from https://en.wikipedia.org/wiki/Richmond%E2%80%93San_Rafael_Bridge 2019/11/4]

At the time, the 1977-1978 drought was the benchmark drought: unfortunately, a worse drought was to come. Beginning around 2013, a series of dry years parched the state to within an inch of its life. I believe that had the drought continued for another year or two, California would have been at least partially destroyed. This drought, along with the associated wildfires, was a real wakeup call for California. Unlike the 1977-1978

drought, it ground on for years, and seemed to signal structural changes in California's weather patterns, perhaps long-term changes. It now appears that California's climate may be becoming warmer and drier, with less predictable precipitation. It also appears that these changes may be due, at least in part, to human activity, perhaps even deliberate activity. [Wigington, D. (n.d.) GeoEngineering Watch. Retrieved from

<https://www.geoengineeringwatch.org/> 2019/11/4]

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